

Look Up Full TextFind PDF

AExport...Add to Marked List

Potts Model with Competing Interaction Up to the Third Nearest-neighbour Generation on a Cayley Tree

By: [Ganikhodjaev, N](#) (Ganikhodjaev, Nasir)^[1]; [Rodzhan, MHM](#) (Rodzhan, Mohd Hirzie Mohd)^[1]; [Basirudin, S](#) (Basirudin, Sahira)^[1]

JURNAL FIZIK MALAYSIA
Volume: 40 Issue: 1
Published: 2019
Document Type: Article

Abstract

It is in our interest to investigate the effect of the third nearest-neighbour binary interaction to the phase diagrams of the Potts model on a Cayley tree. Therefore, we generate and analyse the phase diagrams of the Potts model, considering prolonged competing binary interaction $J(2)$ and $J(3)$ on the same branch of the Cayley tree up to the third nearest-neighbour generations. We derive the recurrence system of equations while taking into account some ranges of competing parameters. We carry out a numerical procedure by applying several stability conditions and characteristic points into the iteration scheme. For some non-zero parameter $J(3)$, we found the additional phases of period 5, 6, 9, and 11, with the ferromagnetic, antiphase, paramagnetic, antiferromagnetic and modulated phase. For the modulated phase, we further study the existence of phases with period larger than 12 by conducting a numerical analysis on the variation of wavevector and Lyapunov exponent.

Keywords

Author Keywords: [Cayley tree](#); [competing interaction](#); [phase diagram](#); [Potts model](#); [statistical mechanics](#)

KeyWords Plus: [ISING-MODEL](#); [PHASE-DIAGRAM](#)

Author Information

Reprint Address: [Ganikhodjaev, N](#) (reprint author)

[+](#) [Int Islamic Univ Malaysia Kuantan, Dept Computat & Theoret Sci, Jalan Sultan Ahmad Shah, Kuantan 25200, Pahang, Malaysia.](#)

Addresses:

[+](#) [\[1 \] Int Islamic Univ Malaysia Kuantan, Dept Computat & Theoret Sci, Jalan Sultan Ahmad Shah, Kuantan 25200, Pahang, Malaysia](#)

Funding

Funding Agency	Grant Number
International Islamic University Malaysia	RIGS17-092-0667

[View funding text](#)

Publisher

INST FIZIK MALAYSIA, C/O PHYSICS DEPT, UNIV MALAYSIA, KUALA LUMPUR, 50603, MALAYSIA

Categories / Classification

Research Areas: [Physics](#)

Web of Science Categories: [Physics](#), [Multidisciplinary](#)

[See more data fields](#)

Citation Network

In Web of Science Core Collection

0

Times Cited

[Create Citation Alert](#)

14

Cited References

[View Related Records](#)

Use in Web of Science

Web of Science Usage Count

0

Last 180 Days

0

Since 2013

[Learn more](#)

This record is from:
Web of Science Core Collection
- Emerging Sources Citation Index

Suggest a correction

If you would like to improve the quality of the data in this record, please [suggest a correction](#).

Cited References: 14

Showing 14 of 14 [View All in Cited References page](#)

(from Web of Science Core Collection)

1. [On phase transitions of the Potts model with three competing interactions on Cayley tree](#)
By: [Akin, H.](#); [Temir, S.](#)
CONDENSED MATTER PHYSICS Volume: 14 Issue: 2 Article Number: 23003 Published: 2011

Times Cited: 8

2. Title: [not available]
By: [Baxter, R.J.](#)
Exactly solved models in statistical mechanics Published: 1982
re-printed 1989; Dover N.Y. 2007
Publisher: Academic Press, London, UK

Times Cited: 4,689

3. **Ferromagnetic Potts model under an external magnetic field: An exact renormalization group approach** Times Cited: 10
 By: Coutinho, Sergio; Morgado, Welles A. M.; Curado, Evaldo M. F.; et al.
 PHYSICAL REVIEW B Volume: 74 Issue: 9 Article Number: 094432 Published: SEP 2006
4. **Modulated Phase of a Potts Model with Competing Binary Interactions on a Cayley Tree** Times Cited: 22
 By: Ganikhodjaev, N.; Temir, S.; Akin, H.
 JOURNAL OF STATISTICAL PHYSICS Volume: 137 Issue: 4 Pages: 701-715 Published: NOV 2009
5. **On Phase Diagram of Ising Model on the Cayley Tree with Restricted Competing Interactions up to the Third-Nearest-Neighbor Generation** Times Cited: 2
 By: Ganikhodjaev, N.; Mohd, Rodzhan M. H.
 MALAYSIAN JOURNAL OF MATHEMATICAL SCIENCES Volume: 10 Special Issue: S Pages: 167-180 Part: 1 Published: FEB 2016
6. **Ising model on the Cayley tree with competing interactions up to the third Nearest-neighbors with spins belonging to different branches of the tree** Times Cited: 4
 By: Ganikhodjaev, Nasir; Mohd Rodzhan, Mohd Hirzie
 JOURNAL OF THE KOREAN PHYSICAL SOCIETY Volume: 66 Issue: 8 Pages: 1200-1206 Published: APR 2015
7. **Ising model with competing "uncle-nephew" interactions** Times Cited: 4
 By: Ganikhodjaev, Nasir
 PHASE TRANSITIONS Volume: 89 Issue: 12 Pages: 1196-1202 Published: 2016
8. **Phase diagram of the three states Potts model with next nearest neighbour interactions on the Bethe lattice** Times Cited: 22
 By: Ganikhodjaev, Nasir; Mukhamedov, Farrukh; Pah, Chin Hee
 PHYSICS LETTERS A Volume: 373 Issue: 1 Pages: 33-38 Published: DEC 22 2008
9. **ISING-MODEL WITH COMPETING INTERACTIONS ON A CAYLEY TREE** Times Cited: 42
 By: INAWASHIRO, S; THOMPSON, CJ; HONDA, G
 JOURNAL OF STATISTICAL PHYSICS Volume: 33 Issue: 2 Pages: 419-436 Published: 1983
10. **PHASE-DIAGRAM OF THE ISING-MODEL ON A CAYLEY TREE IN THE PRESENCE OF COMPETING INTERACTIONS AND MAGNETIC-FIELD** Times Cited: 49
 By: MARIZ, AM; TSALLIS, C; ALBUQUERQUE, EL
 JOURNAL OF STATISTICAL PHYSICS Volume: 40 Issue: 3-4 Pages: 577-592 Published: 1985
11. **Worm algorithms for the 3-state Potts model with magnetic field and chemical potential** Times Cited: 16
 By: Mercado, Ydalia Delgado; Evertz, Hans Gerd; Gattringer, Christof
 COMPUTER PHYSICS COMMUNICATIONS Volume: 183 Issue: 9 Pages: 1920-1927 Published: SEP 2012
12. **SOME GENERALIZED ORDER-DISORDER TRANSFORMATIONS** Times Cited: 1,541
 By: POTTS, RB
 PROCEEDINGS OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY Volume: 48 Issue: 1 Pages: 106-109 Abstract Number: A1952-04502 Published: 1952
13. **Title: [not available]** Times Cited: 1
 By: Rozikov, U. A.
 Gibbs Measures on Cayley Trees Published: 1970
 Publisher: World Scientific Publishing, Singapore
14. **MODULATED PHASE OF AN ISING SYSTEM WITH COMPETING INTERACTIONS ON A CAYLEY TREE** Times Cited: 101
 By: VANNIMENUS, J
 ZEITSCHRIFT FUR PHYSIK B-CONDENSED MATTER Volume: 43 Issue: 2 Pages: 141-148 Published: 1981

Showing 14 of 14 [View All in Cited References page](#)

